

IMT

MATERIAL HANDLING SYSTEMS

RCL Safety System Instruction Manual

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Iowa Mold Tooling Co., Inc. is an Oshkosh Truck Corporation company.

In addition to the information presented in this manual, read and understand the IMT Crane Operator's Safety Manual before operating or performing any maintenance on your crane.

REVISIONS LIST

DATE	LOCATION	DESCRIPTION OF CHANGE
20020819	5,15,16,18	Corrected - symbols on wiring diagram.
20070222	Cover	New ownership statement.

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Introduction

This electronic safety systems operation manual is meant for the user of the crane and must be considered a supplement to the Instruction Manual for the specific crane.

The electronic safety systems are based on three separate types of controllers: the RCL 5100 used on smaller cranes, the RCL 5200 which is used on larger cranes with optional extras, and the RCL 5250 which, by means of a display, informs the operator of different operating conditions.

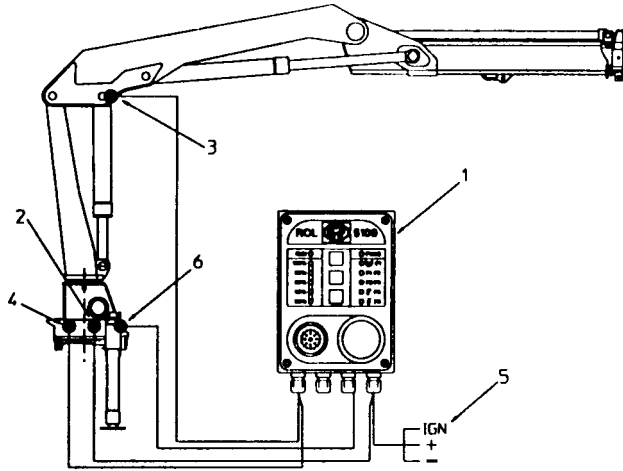
A common characteristic of all the safety systems is that the controller is constantly monitoring the crane's conditions as regards load moment, operation and function.

The basic principle of the system in cases of overload, erroneous operation or malfunction, is first and foremost to warn the operator, and then if he does not interfere, automatically to interrupt the power supply (the crane is stopped).

CAUTION

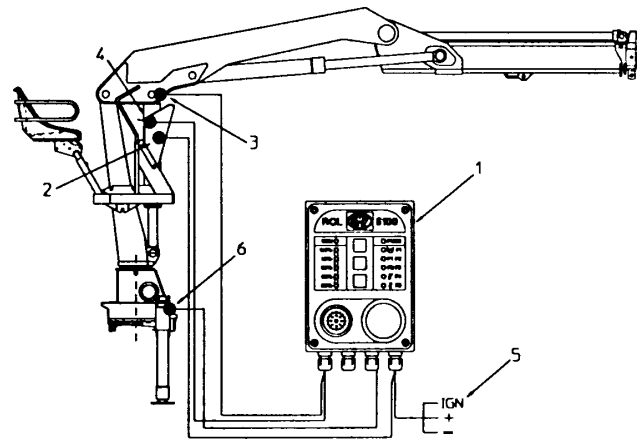
- The safety system increases safety in connection with crane operation but, as the operator, you are still responsible for safe operation of the crane.
- Press the stop button in case of a dangerous situation.
- Be careful not to spray water on, or to high pressure wash the electric system.
- Troubleshooting must only take place according to this manual and then an IMT service center should be contacted.

Safety System RCL 5100, Standard Crane

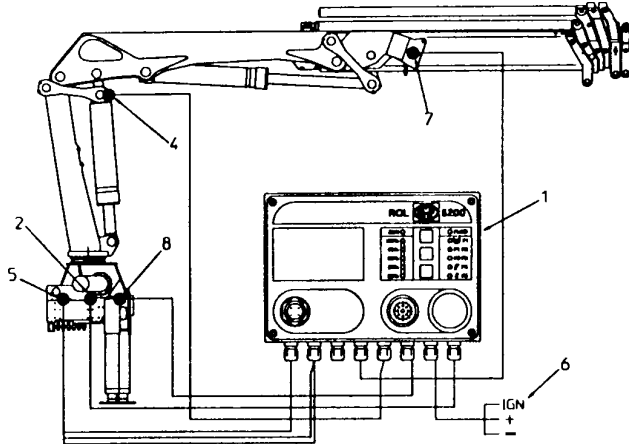


1. RCL 5100 controller
2. Dump valve
3. Pressure transducer
4. Spool sensor, boom
5. Power supply
6. External stop button

Safety System RCL 5100 TS, Single Circuit/Dual Circuit

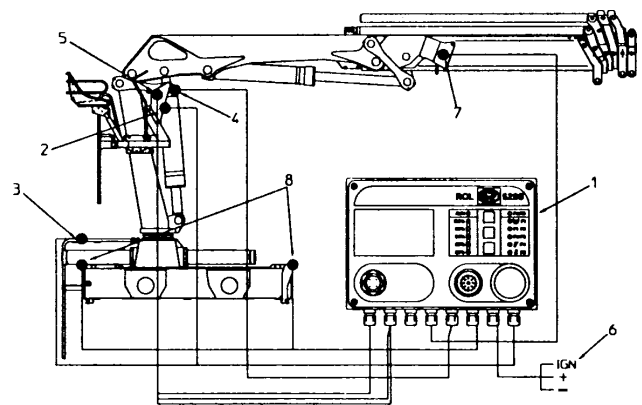


Safety System RCL 5200/5250, Std Crane



1. RCL 5200 controller
2. Dump valve
3. Dump valve, 2-circuit
4. Pressure transducer
5. Spool sensor, boom, jib, extension
6. Power supply
7. Mercury switch
8. External stop button

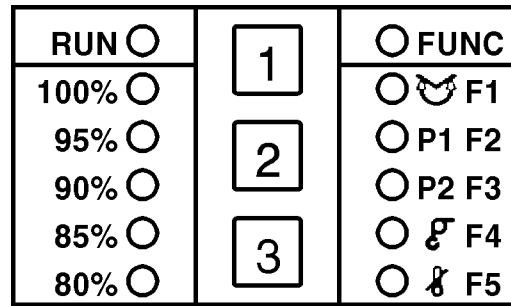
Safety System RCL 5200/5250 TS, Single Circuit/Dual Circuit



Sensors and Indicators

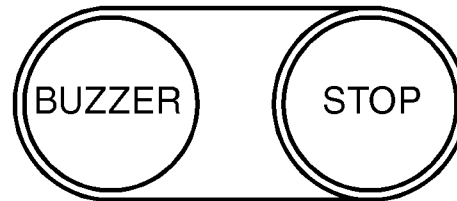
It is important that the operator is familiar with and knows the function of the individual buttons and indicators on the controller's indicator panel.

Except for a few exceptions as to function, the indicator panels on the RCL 5100, 5200 and 5250 are identical. The RCL 5200/5250 is larger and also has a plug for connection of a test terminal or a PC. Furthermore, the RCL 5250 has a display on the indicator panel, as well as arrow keys.



Buttons and indicators as shown below are the same on all three types of controllers:

- The RUN diode is green.
- The FUNC diode is yellow.
- The other diodes are red.



Function of Buttons and Indicators

BUTTON	FUNCTION
1-RED	Overriding in case of overloading / emergency operation / indication of errors /manual HDL.
2-YELLOW	Alternative function mode.
3 GREEN	System activation / deactivation of buzzer.

INDICATOR	FLASHING LIGHT	CONSTANT LIGHT
	PERIODIC SIGNAL	CONSTANT SIGNAL
BUZZER	Load moment >90%/override/error	Any reason for stopping-(dump)
RUN	System error	Normal operation mode
100%	Load moment >100%+SLM stop	Load moment >100%
95%	Load moment >95%+SLM stop	Load moment >95%
90%	Load moment >90%+SLM stop	Load moment >90%
85%	Load moment >85%+SLM stop	Load moment >85%
80%	Load moment >80%+SLM stop	Load moment >80%
FUNC		Alternative function mode (F1,F2,F3,F4,F5).
SLEW / F1	Load moment >max. permissible load moment in reduced working area	Slewing limitation
P1/F2	Load moment, crane >80% + crane w/ largest load moment	Overload stop - crane
P2/F3	Load moment, Flying Jib >80% + Flying Jib w/ largest load moment	Overload stop - Flying Jib
WINCH / F4	Load moment, winch >100% / wire outlet / wire overflow	Winch stop
TEMP / F5	Warning of too high oil temperature.	

Starting the Crane

Before start up, the operator must carry out the following:

- Engage the pump via the PTO; the controller will then be powered.
- Push the green button to activate the system.
- The green diode RUN is now constantly lit, indicating that the safety system is ready for operation.
- Prepare the crane for start up according to the Instruction Manual for the crane.

Ending Crane Operation

After crane operation, disengage the PTO, the power for the controller is thus interrupted.

Controller Stand-By Mode

The controller has been programmed to switch into stand-by mode after 10 minutes, i.e. if a certain crane function (with a spool sensor) has not been operated for 10 minutes, the controller will automatically turn off and go into stand-by mode where the power consumption is reduced to 10%.

The following factors will reactivate the controller:

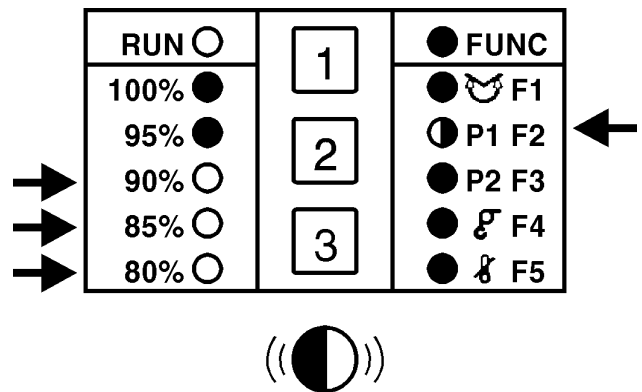
- When pressing the green button.
- Activation of the control lever for the boom function (or depending on which optional extra used, any of the control levers with a spool sensor).

Indication of Load

- During crane operation, the red diodes indicate the load crane operation, the load moment in percentage between 80% and 100%.
- When the maximum load moment is between 80% and 100%, the red diode P1 will also flash.

Indication of 90% Load Moment

- At a load moment of 90%, the red diodes indicating 80%, 85% and 90% are lit.
- The buzzer gives a periodic signal.
- The red diode P1 continues to flash (between 80% and 100%)



The signalling, as described, continues until the load moment falls below 90% again.

NOTE

The diodes do not immediately indicate this reduction of the load moment. A time-lag has been built into the system to keep the indications stable during variation of load.

Load Moment between 80% and 100%

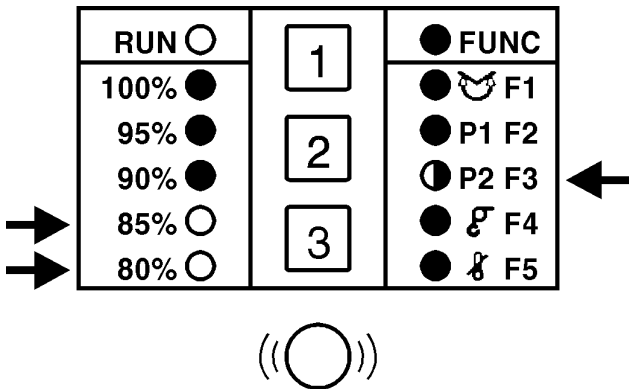
If the crane is fitted with a Flying Jib, the crane and the Flying Jib will seldom have the same load moment.

RCL 5200/5250:

- When the red diode P1 flashes, it indicates that the crane has the largest load moment.
- When the red diode P2 flashes, it indicates that the Flying Jib has the largest load moment.
- The red diodes 80 through 100% are constantly related to either P1 or P2 (the load moment of the crane or the Flying Jib).

Only one of the diodes, P1 or P2, is lit at this time. It will thus be possible during crane operation to follow whether the crane or the Flying Jib has the largest load moment. This offers the possibility of using the crane/Flying Jib to its maximum.

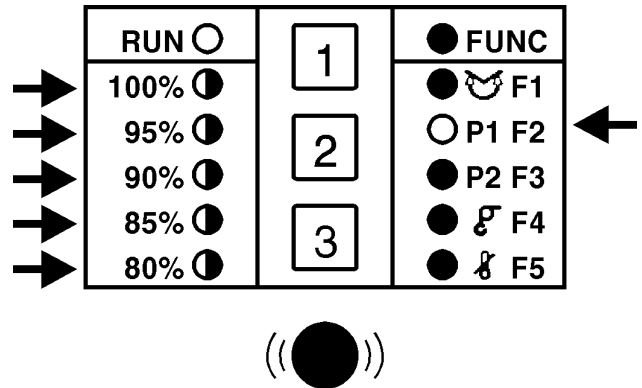
Example:
The flying jib has the largest load moment (85%).



The crane's load moment is constantly checked by an SLM (Superior Load Monitoring) safety system, which is activated if the maximum permissible load moment of the crane is exceeded.

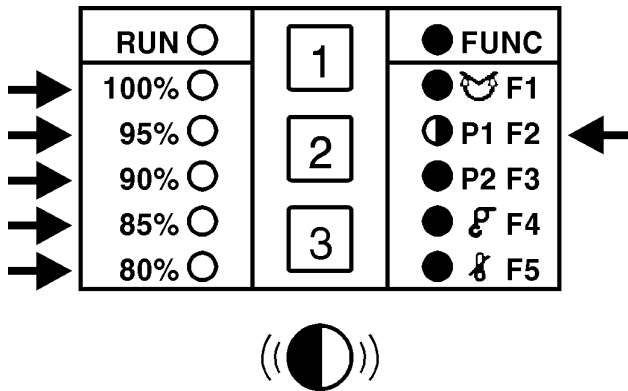
When the maximum load moment is 100%, the controller indicates as follows:

- All red diodes 80% - 100% are flashing (SLM is activated).
- The buzzer gives a constant signal.
- The diode P1 is constantly lit.
- The dump valve opens to tank during a certain period (the dump period), and all crane movements are stopped.



After a short dump period the controller indicates as follows:

- All red diodes 80% - 100% are constantly lit (the SLM is deactivated).
- The buzzer gives an interrupted signal.
- The diode P1 flashes.
- The dump valve closes to tank, and it will be possible to operate the crane again (the movement must be load moment reducing).
- It will however not be possible to operate the crane before the control lever for the boom function has been put into neutral position.



Erroneous Operation after a Dump Period:

In a situation when the crane can be operated again after a dump period, it will be possible to make load moment increasing movements by making erroneous operation.

In this case of further overloading of the crane, the safety system SLM will be reactivated and a new and longer dump period will follow (with the diode/buzzer indications as previously mentioned).

In case of further erroneous operation (overloading) the subsequent dump periods will be increased accordingly.

CAUTION

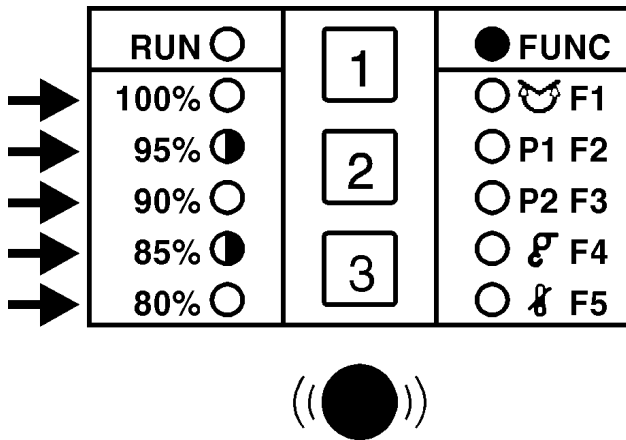
- Abusing the SLM-system to deliberately overload the crane is not permitted.
- The first time a crane movement is stopped by the SLM- system because of overload, load moment reducing movements must be made.
- The number of times the crane has been overloaded, how long a time it has been overloaded and how much it has been overloaded is registered in memory registers. Please see chapter on Registering of Data.

Absolute Stop

After the crane having been into SLM-stop and then by erroneous operation into a further number of stops (with long dump periods), the SLM-safety system will finally go into an absolute stop, and the crane can no longer be operated.

Indication of absolute stop:

- The 85% and 95% diodes flash.
- The other red diodes are constantly lit.
- The buzzer gives a constant signal.



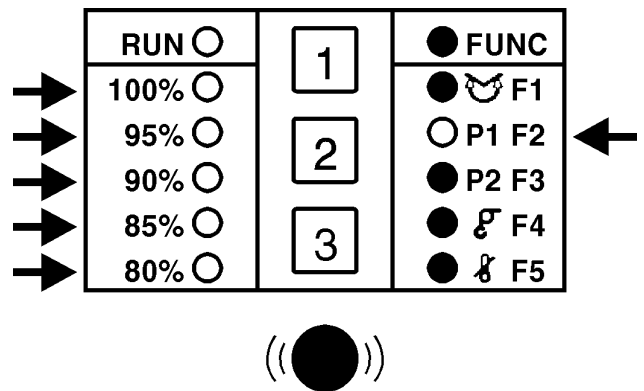
NOTE

In order to get out of this situation, the only possibility is a "last chance" emergency operation. Please see the chapter regarding this.

The load moment of the crane is constantly checked by the TCL (Traditional Capacity Limitation) safety system, which is activated if the crane is overloaded.

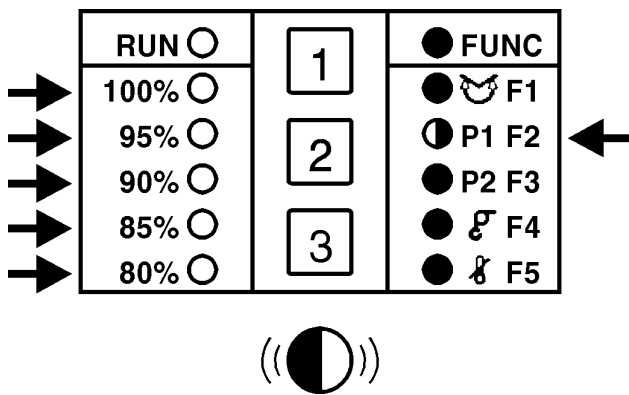
When the maximum load moment is 100%, the controller indicates as follows:

- All red diodes, 80% through 100%, are constantly lit (TCL is activated).
- The buzzer gives a constant signal.
- The diode P1 is constantly lit.
- The dump valve opens to tank and the crane movement causing the overload is stopped.



When all controls are in neutral position again, controller indicates following:

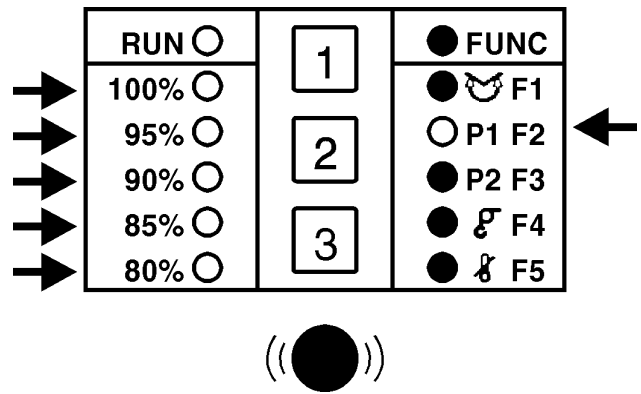
- All red diodes 80% through 100% are constantly lit.
- The TCL is deactivated.
- The buzzer gives a periodic signal.
- The diode P1 flashes.
- The dump valve closes to tank, and it will be possible to operate load moment reducing movements.



Erroneous Operation after Deactivation of the TCL:

In a situation (after TCL-stop), where a load moment increasing function is operated unintentionally, the controller indicates as follows:

- All red diodes, 80% - 100%, are constantly lit. (TCL is activated again).
- The buzzer gives a constant signal.
- The diode P1 is constantly lit.
- The dump valve opens to tank again until the lever of the control valve is in neutral position. (Levers for functions able to increase the load moment).



The Override Function

If the crane is “stuck” in an overload situation, because of various reasons, it is not possible to make load moment reducing movements, the safety system can be overridden (bypassed) when pushing the red button.

While the red button is being pressed (the buzzer gives a periodic signal), the crane can be operated for 5 seconds to position the load out of the locked situation, if possible.

If it is not possible to bring the load into an acceptable position within these 5 seconds, it will be possible, with an interval of 30 seconds, to operate the crane again during 5 seconds.

The waiting period of 30 seconds is not reset until after the 5 second override (i.e. if only 3 seconds are used at the first override, the controller will remember that the second time the system will only be able to override during 2 seconds).

After turning on the controller, it takes 30 seconds before the override function can be used.

The override function is only active in connection with overloading. It does not work in case of system errors.

WARNING

Abusing the override function is not permitted, as this may lead to very dangerous situations. Furthermore, abusing the override function will cause a very long dump period (long waiting time before the crane can be operated again) by the SLM safety system

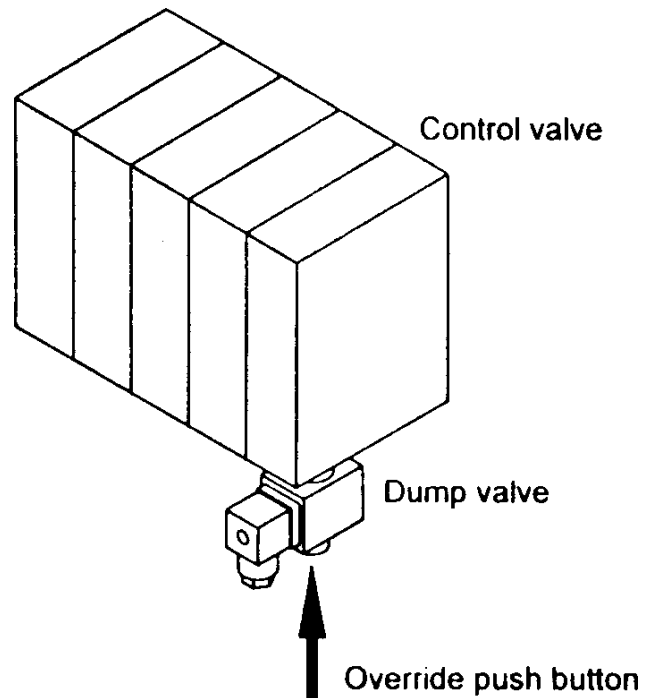
“Last chance” Emergency Operation

If, during crane operation, a situation occurs where for example the electric connection between the power supply (the battery of the vehicle) and the controller fails, a manual override button on the dump valve can be pushed at the same time as the control valve is operated.

This is how emergency operation is made possible, and the crane can be brought out of a dangerous position, if necessary, and then be folded so that the vehicle may be driven away.

WARNING

Abusing this safety detail is not permitted, it must only be used for emergency operation. When using the manual override function, the button must be sealed again (at an authorized IMT service center).

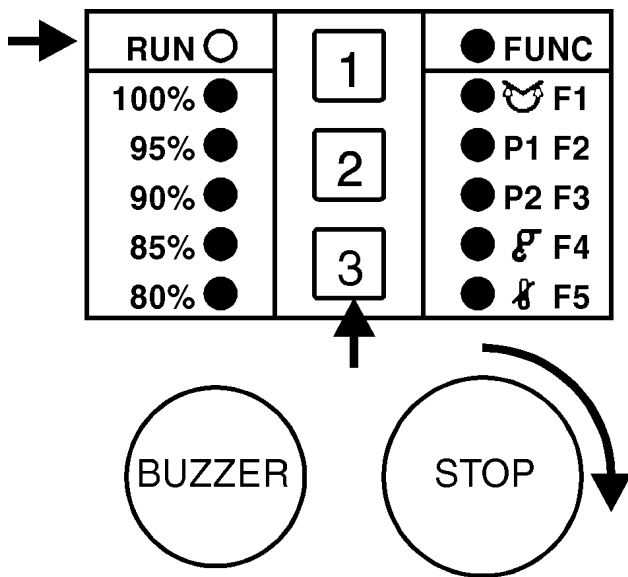


Emergency Stop

If a dangerous situation occurs, push the stop button. The controller then interrupts the power supply to the crane (the dump valve opens and the oil is sent to tank).

Starting up after emergency stop:

- Turn the stop button, which will then return to its starting position.
- Push the green button.
- The green RUN diode is now constantly lit, indicating that the safety system is ready for working.



Disconnection of Buzzer

In cases where crane operation takes place, particularly in the load moment area exceeding 90%, the buzzer will correspondingly give an interrupted signal most of the time.

The interrupted signal from the buzzer over time may be very disturbing, and therefore it is possible to disconnect it.

After the sounding of the buzzer (an interrupted signal) for 5 seconds, it is disconnected by pushing the green button.

From the moment the buzzer changes status (i.e. the load moment falls below 90%), it will automatically go out of disconnection mode again, i.e. if the load moment exceeds 90%, the buzzer will start giving an interrupted signal again.

Registering of Data

The controller has a "Black Box"-function currently registering data in memory registers, i.e. information on load moment, operation, functioning and service conditions.

The information is read by connecting either a test terminal or a PC during the annual service overhaul at an IMT service center.

Some of this information is available on controller 5250, which has a display on the indicator panel.

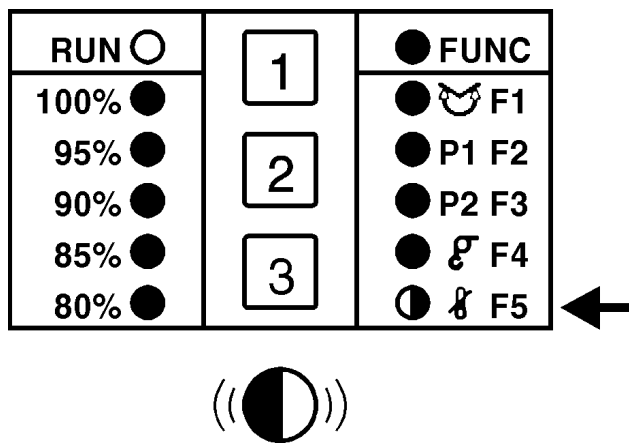
Checking of Oil Temperature (RCL 5200/5250)

By connection of a temperature sensor (fitted in the tank connection), the RCL 5200 and RCL 5250 controllers can check the temperature of the hydraulic oil.

Warning at High Oil Temperature

If the maximum permissible operation temperature of the oil is exceeded, the controller indicates as follows:

- The buzzer gives an interrupted signal.
- The diode for oil temperature flashes.



Stop of Crane when Superheating

If the oil temperature increases further, the controller interferes and stops the crane before the oil is superheated and damages the hydraulic system. Please see the chapter on Troubleshooting regarding indication.

Crane operation cannot be started again until the oil has been sufficiently cooled.

Connection of Options

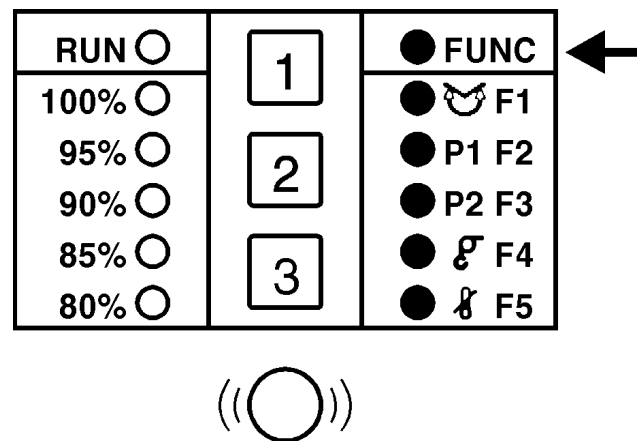
The controller can be extended with CAN bus satellite connections offering the possibility of extending the system with optional extras.

This equipment can be activated in the following way:

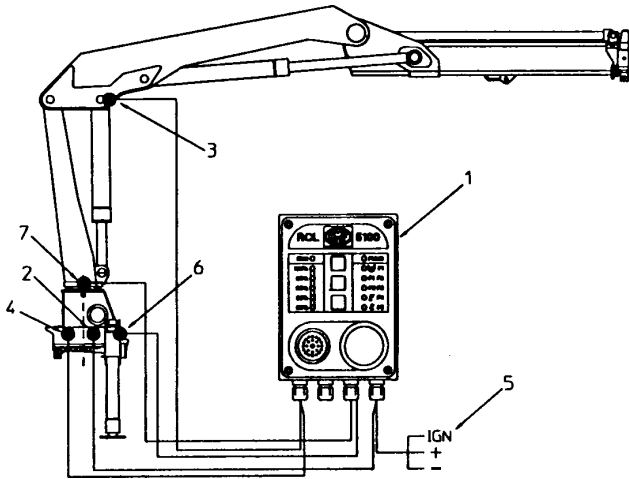
- Push the yellow button.
- The yellow diode FUNC is constantly lit.

The right column of diodes now indicates the functions F1 through F5. Up to 5 different kinds of optional extras can be connected and the diodes now indicate which optional extra that is connected at the moment in question.

If the crane is delivered with such supplementary functions, a thorough description will follow in each case.

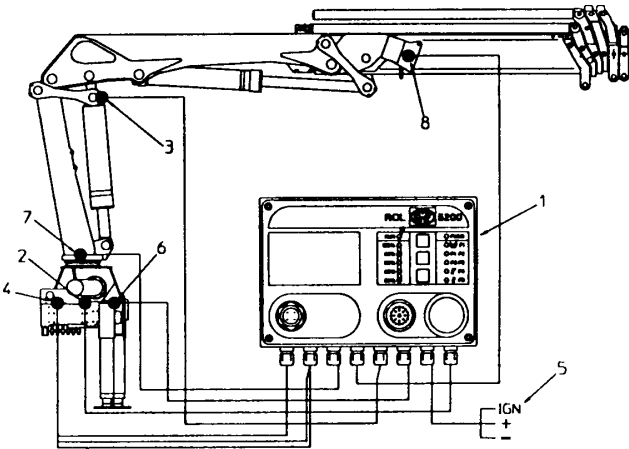


Configuration-RCL 5100, 2-Stage Monitoring of Load Moment



- 1. RCL 5100 controller
- 2. Dump valve
- 3. Pressure transducer
- 4. Spool sensors (boom, slew)
- 5. Power supply
- 6. External stop button
- 7. Inductive sensor
- 8. Mercury switch

Configuration-RCL 5200/5250, 2-Stage Monitoring of Load Moment



The Safety System

If the crane is not stable in the entire slewing area of the crane (for example in front of the driver's cab), the RCL safety system is extended with a 2-stage monitoring of the load moment.

The 2-stage monitoring of the load moment ensures that the lifting capacity of the crane is reduced in the slewing area where the vehicle is unstable.

Working in the Stable Slewing Area

- If working with a load moment lower than the capacity in the unstable area, no indication will occur on the controller.
- If working with a load moment higher than the capacity in the unstable area, the controller will indicate as follows: the diode with the slewing limitation symbol flashes and warns the operator of the slewing movement being stopped, if this movement gets into the unstable area.

RUN ○	1	● FUNC
100% ●	2	◐ F1 ←
95% ●	3	● P1 F2
90% ●		● P2 F3
85% ●		● ⚙ F4
80% ●		● ⚙ F5

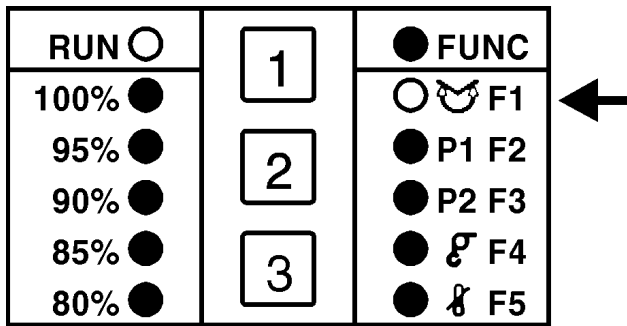


Slewing with a too Large Load Moment towards the Unstable Slewing Area

If, (despite the warning) the slewing movement has a too large load moment from the stable to the unstable area, the slewing movement will be stopped and the controller indicates as follows:

- The diode with the slewing limitation symbol is constantly lit.
- The buzzer gives a constant signal.
- The dump valve opens to tank (the slewing movement is stopped).

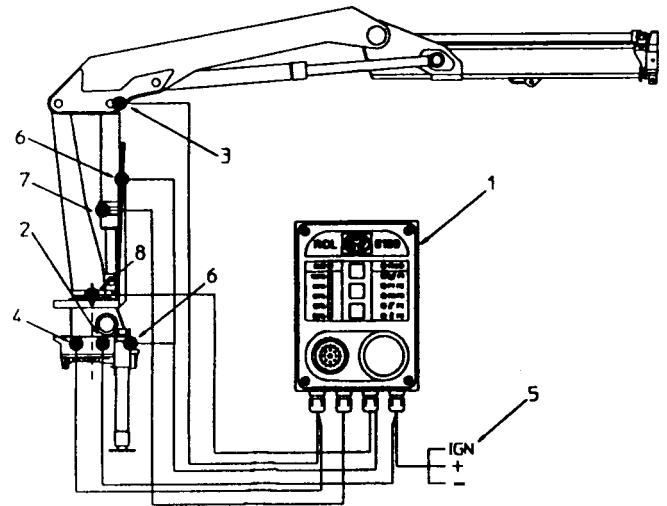
To be able to move into the unstable slewing area the load moment should now be reduced to the capacity in this area.



Working in the Unstable Area

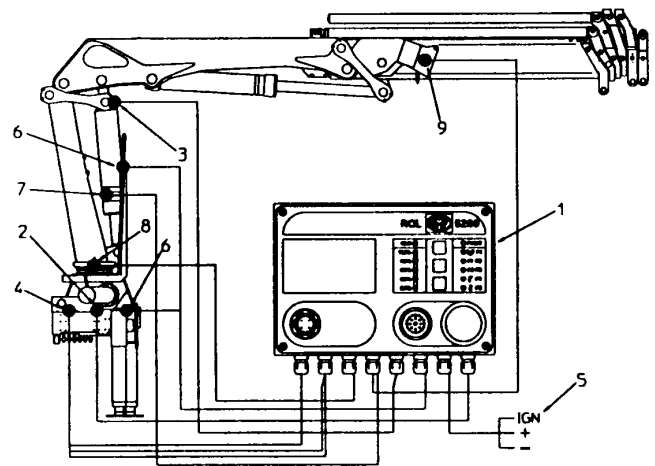
If working with the crane in the unstable area, the monitoring of the load moment functions exactly as in the stable area, however the max. permissible load moment is reduced. i.e. the diode/buzzer indications function as normal but at a lower level (indication with the 100% diode means that the load moment is at the max. permissible limit corresponding to the capacity in the unstable area).

Configuration-RCL 5100, Stand-up Controls



1. RCL controller
2. Dump valve
3. Pressure transducer
4. Spool sensors (boom, slew)
5. Power supply
6. External stop button
7. Inductive sensor (HS)
8. Inductive sensor (slew)
9. Mercury switch

Configuration-RCL 5200/5250, Stand-up Controls



The Safety System

If the crane is fitted with stand-up controls (HS), the RCL safety system is extended with one of the following systems depending on the country to which the crane is delivered:

- Slewing limitation, stand-up controls
- Warning during slewing movement over stand-up controls

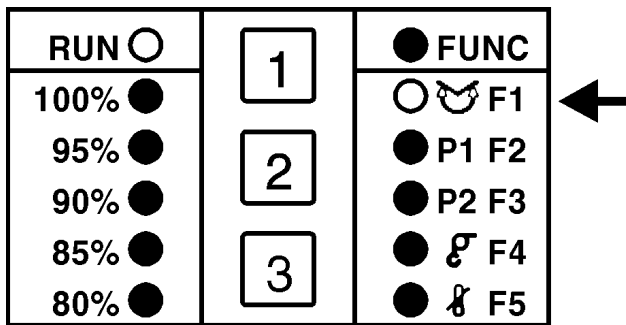
The safety system must protect the operator against being squeezed by the boom, when he operates the crane from the platform for the stand-up controls.

If the operator stands on the ground operating the crane, this safety system is not activated, and the crane is free to move provided that the vehicle is stable (please see the chapter on 2- stage monitoring of the load moment).

Slewing Limitation, Stand-Up Controls

When the operator is standing on the platform for the stand-up controls and the slewing movement is to the right, this movement will be stopped before the boom moves over the HS-platform. The boom cannot be moved over the operator. The controller indicates as follows:

- The diode with the slewing limitation symbol is constantly lit.
- The buzzer gives a constant signal.
- The dump valve opens to tank (the slewing movement is stopped).

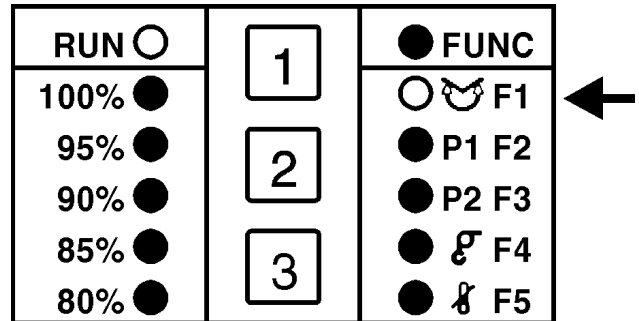


Warning during Slewing Movement over Stand-Up Controls

When the operator stands on the platform for the stand-up controls and the slewing movement is to the right, the buzzer gives an interrupted signal before and while the boom moves over the HS-platform. (The slewing movement is not being stopped).

If the operator tries to use the “boom down” function in the area over the platform, the controller indicates as follows:

- The diode with the slewing limitation symbol is constantly lit.
- The buzzer gives a constant signal.
- The dump valve opens to tank (the slewing movement is stopped). This is to prevent the operator from accidentally lowering the boom over himself.

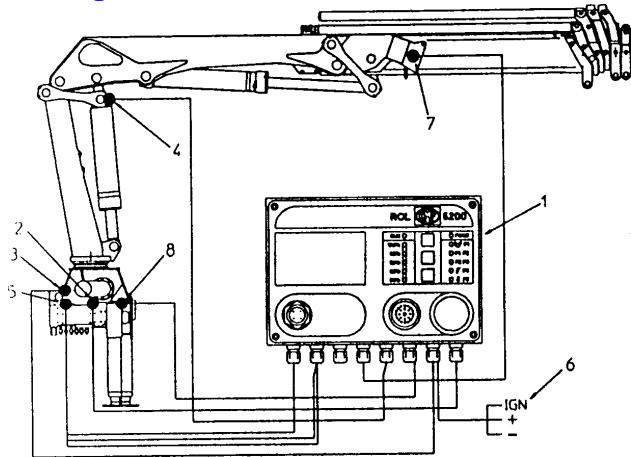


Combination of 2-Stg Monitoring of Load Moment & Safety System-Stand-Up Ctrls

The sensors and other equipment are the same as used in connection with safety system, stand-up controls.

Only here the controller has been programmed to control both safety systems.

Configuration-RCL, HDL 2



1. RCL controller - 5100/5200/5250
2. Dump valve
3. HDL valve
4. Pressure transducer
5. Spool sensors
6. Power supply
7. Mercury switch
8. External stop button

HDL on/off



RUN ○	1	● FUNC
100% ●	2	● F1
95% ●	3	● P1 F2
90% ●		● P2 F3
85% ●		● F4
80% ●		● F5

The HDL System

The HDL system offers the possibility of increasing the nominal load when reducing the working speed simultaneously.

When the crane reaches its normal lifting capacity limit, the HDL system will automatically couple in, irrespective of the operator's actions and the oil flow to the control valve will be reduced (by means of an HDL valve being operated by the controller) to approx. 20% of the normal oil flow.

This is how the crane's lifting capacity is increased by approx. 10% in the entire working area of the crane.

When the HDL system couples in, the operator will be able to continue extending the load without interruption, although at reduced speed.

RCL 5100 and the HDL System

The HDL system is semi-automatic which means that the system is automatically activated at the normal lifting capacity limit of the crane but by means of the red button, the operator must manually disconnect the system.

This disconnection implies that the load moment is below the crane's normal lifting capacity limit.

The buzzer gives a periodic signal as usual at 90% of the max. permissible load moment (90% of the HDL lifting capacity limit).

RCL 5200/5250 and the HDL System

The HDL system is fully automatic which means that the system is automatically activated when the load moment has been increased to the loaded normal lifting capacity limit and it is automatically disconnected when the load moment is reduced below this limit.

However, the automatic deactivation implies that all control levers have been into neutral position at the same time as the load moment is below the crane's normal lifting capacity limit.

Micro Operation

If, for instance the crane is to make positioning tasks it will be possible to **reduce the working speed of the crane** by means of the HDL system.

Irrespective of the crane's load moment, the working speed of the crane can be reduced to approx. **20% by means of the red button.**

When pushing the red button, the buzzer indicates this with a short signal.

When **normal speed** is required **again**, press the red button again. Again the buzzer indicates this operation with a short signal.

However, operating with normal speed again implies that all control levers have been into neutral position at the same time as the load moment is below the crane's normal lifting capacity limit.

Indication of Errors

If, during crane operation, a system error occurs internally in the controller or externally in plugs, cables, sensors etc., the controller indicates as follows:

- The RUN diode starts to flash.
- The buzzer gives a periodic signal.
- **In case of dangerous system errors** the buzzer gives a constant signal and the dump valve opens to tank (all crane movements are stopped.)

System errors are graduated into 3 levels as regards danger, i.e. which intervention the safety system should make:

1. **Relatively non-dangerous system errors** demanding a warning (indication).

2. **Less dangerous system errors** demanding warning/derating (indication/reduction of lifting capacity).

3. **Dangerous system errors** demanding stopping of the crane (the dump valve opens).

When pushing the red button the diodes will be lit in a combination indicating where in the system the error is to be found.

The left row of diodes indicates the category of error type and the right row of diodes specifies where the error is to be found on the crane.

The chapter - Troubleshooting - states where the error can be found in relation to the diode indications.

Emergency Operation of the Crane




In connection with a dangerous system error:

- The RUN diode flashes.
- The buzzer gives a constant signal.
- The dump valve opens to tank.

Emergency operation can take place at the same time as the red button is kept down.

CAUTION

No matter which level of system error (category of error), the error must be found and corrected. Please see the chapter on Troubleshooting.

RUN ●	1	● FUNC
100% ●	2	●  F1
95% ●	3	● P1 F2
90% ●		● P2 F3
85% ●		●  F4
80% ●		●  F5



How to Troubleshoot

If the controller indicates a system error - the RUN diode flashes and the buzzer gives a periodic/constant signal (please see chapter on Indication of Errors) - the operator must search for errors in the following way:

Press the red button and the controller indicates as follows:

- The RUN diode flashes.
- The buzzer gives a periodic signal.
- Some of the red diodes are flashing in a combination indicating the type of error.

Explanation to the Troubleshooting Charts

When comparing the flashing combination of diodes with the following charts, it will be possible to state the type of error, the cause of the error as well as remedying the error.

In the section intervention from the safety system a code number is stated:

1. Indication:

It is a relatively harmless system error and the present crane operation can be finished.

2. Reduction of the lifting capacity to 90%:

It is a less dangerous system error and the present crane operation can be finished, however the lifting capacity will be reduced.

3. Stop of the crane:

It is a dangerous system error stopping the crane movements. It will be possible to make an emergency operation (please see chapter on Emergency Operation of the Crane), i.e. the crane is folded and the error must be remedied.

CAUTION

No matter the type of error, the error must be found and corrected.


In the section Emergency Operation of the Crane a code letter is stated:













Y: means that the emergency operation can be made (dangerous system error)

N: means that emergency operation is not possible (relatively harmless / less dangerous system error).
The present crane operation can be finished.

In the section controller is stated for which type of controller, the indication of error concerns. As the controller RCL 5100 has less facilities than the RCL 5200, there are consequently less types of indications.

The RCL 5250 is not included as it is equipped with a display. In case of an error, the indication of error can be read from the display.


 Flashing diode

RUN 		 FUNC	Type of error	Controller
100% 	1	 F1	Type of error	
95% 	2	 P1 F2		
90% 	3	 P2 F3	Correcting the error	
85% 		 F4		
80% 		 F5		

Emergency operation of the crane
Y = yes
N = no

Intervention from the safety system
1. Indication
2. Reduction of the lifting capacity (90%)
3. Stopping of crane

Buzzer indicaion

 Periodic signal

 Constant signal

Troubleshooting Charts

RUN	1	● FUNC	Incorrect set-up of crane	5100/5200
100%	2	F1	The controller's internal set-up of crane is not correct.	
95%		P1 F2		
90%		P2 F3		
85%		F F4		
80%	3	F F5	Contact an IMT Service Center.	
	3	Y		

RUN	1	● FUNC	Error in crane parameter memory	5100/5200
100%	2	F1	The controller's internal set-up of crane is not correct.	
95%		P1 F2		
90%		P2 F3		
85%		F F4		
80%	3	F F5	Contact an IMT Service Center.	
	3	Y		

RUN	1	● FUNC	Oil temperature too high	5200
100%	2	F1	May be defective oil cooler connection.	
95%		P1 F2		
90%		P2 F3		
85%		F F4		
80%	3	F F5	System is ready when oil temperature is below max. permissible limit, otherwise contact an IMT Service Center.	
	3	Y		

RUN	1	● FUNC	Outlet error - dump valve	5100/5200
100%	2	F1	May be defect in dump valve, cable, short circuit or super-heating of dump valve outlet.	
95%		P1 F2		
90%		P2 F3		
85%		F F4		
80%	3	F F5	Check cables, socket outlet, plug, etc., for the dump valve. Otherwise contact an IMT Service Center. Emergency operation will not be possible if error is in dump valve.	
	3	Y		

RUN	1	● FUNC	Outlet error. HDL valve	5200
100%	2	F1	May be due to defective HDL valve, cable breakdown, short circuit or supeheating of HDL outlet.	
95%		P1 F2		
90%		P2 F3		
85%		F F4		
80%	3	F F5	Check cables, socket outlet, plug, etc., of oil cooler. Otherwise contact an IMT Service Center.	
	2	N		

Troubleshooting Charts (cont)

RUN	<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">1</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">2</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">3</div>	● FUNC	Outlet error. Oil cooler	5200
100% ●		● F1	May be due to defective oil cooler, cable breakdown, short circuit or superheating of oil cooler outlet. Check cables, socket outlet, plug, etc., of oil cooler. Otherwise contact an IMT Service Center.	
95% ●		● P1 F2		
90%		P2 F3		
85% ●		● F4		
80% ●	● F5			
	1	N		

RUN	<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">1</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">2</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">3</div>	● FUNC	Error in pressure transducer boom	5100/5200
100% ●		● F1	May be defective pressure transducer, cable breakdown or short circuit. Check cables, socket outlet, plug, etc., of pressure transducer. Otherwise contact an IMT Service Center.	
95% ●		● P1 F2		
90% ●		P2 F3		
85%		● F4		
80%	● F5			
	3	Y		

RUN	<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">1</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">2</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">3</div>	● FUNC	Error in spool sensor slew	5100/5200
100% ●		● F1	May be defective spool sensor, cable breakdown or short circuit. Check cables, socket outlet, plug, etc., for spool sensor on ctrl valve slewing section. Otherwise contact an IMT Service Center.	
95% ●		● P1 F2		
90% ●		P2 F3		
85%		● F4		
80% ●	F5			
	3	Y		

RUN	<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">1</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">2</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">3</div>	● FUNC	Error in spool sensor, boom	5100/5200
100% ●		● F1	May be due to defective spool sensor, cable breakdown or short circuit. Check cables, socket outlet, plug, etc., of spool sensor on boom function valve section. Otherwise contact an IMT Service Center.	
95% ●		● P1 F2		
90% ●		P2 F3		
85%		● F4		
80% ●	● F5			
	2	N		

RUN	<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">1</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">2</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">3</div>	● FUNC	Error in spool sensor, jib.	5200
100% ●		● F1	May be due to defective spool sensor, cable breakdown or short circuit. Check cables, socket outlet, plug, etc., of spool sensor on jib function valve section. Otherwise contact an IMT Service Center.	
95% ●		● P1 F2		
90% ●		P2 F3		
85%		● F4		
80% ●	F5			
	2	N		

Troubleshooting Charts (cont)

RUN	1	● FUNC	Error in spool sensor, extension.	5200
100% ●	2	● F1	May be due to defective spool sensor, cable breakdown or short circuit.	
95% ●		● P1 F2		
90% ●		● P2 F3		
85%		● F4		
80% ●	3	● F5	Check cables, socket outlet, plug, etc., of spool sensor on extension function valve section. Otherwise contact an IMT Service Center.	
	2	N		

RUN	1	● FUNC	Error in spool sensor, flying jib.	5200
100% ●	2	● F1	May be due to defective spool sensor, cable breakdown or short circuit.	
95% ●		● P1 F2		
90% ●		● P2 F3		
85%		● F4		
80% ●	3	● F5	Check cables, socket outlet, plug, etc., of spool sensor on flying jib function valve section. Otherwise contact an IMT Service Center.	
	2	N		

RUN	1	● FUNC	Error in spool sensor, flying jib ext	5200
100% ●	2	● F1	May be due to defective spool sensor, cable breakdown or short circuit.	
95% ●		● P1 F2		
90% ●		● P2 F3		
85%		● F4		
80% ●	3	● F5	Check cables, socket outlet, plug, etc., of spool sensor on flying jib ext function valve section. Otherwise contact an IMT Service Center.	
	2	N		

RUN	1	● FUNC	Error in spool sensor, winch.	5200
100% ●	2	● F1	May be due to defective spool sensor, cable breakdown or short circuit.	
95% ●		● P1 F2		
90% ●		● P2 F3		
85%		● F4		
80% ●	3	● F5	Check cables, socket outlet, plug, etc., of spool sensor on winch function valve section. Otherwise contact an IMT Service Center.	
	2	N		

There are more types of errors than mentioned in the above charts.

If indication of such a type of error should occur, please contact an IMT service center.

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